

What is claimed is:

1. An electrical overvoltage protection circuit in a dual voltage electrical distribution system having a common return path, a high voltage energy source supplying energy at a first voltage potential to a first load via a first distribution wire, a low voltage energy source supplying energy at a second voltage potential lower than said first voltage potential to a second load via a second distribution wire in physical proximity with the first distribution wire, the protection circuit comprising:

a positive temperature coefficient (PTC) current-limiting device in series between said second voltage source and said second distribution wire, and

a voltage-limiting circuit element in thermal contact with said PTC current-limiting device, connected across said second distribution wire and the common return path and having a voltage limit set to be below said first voltage potential and above said second voltage potential,

whereby when a crossover occurs during which said second distribution wire becomes cross-connected to said first distribution wire, said voltage-limiting circuit element conducts a large current and generates heat which is transferred to said PTC current-limiting device thereby aiding said PTC current-limiting device to switch from an untripped state to a tripped state and limiting current flow from the low voltage energy source through the first voltage distribution wire to a nonhazardous level.

2. The electrical overvoltage protection circuit in a dual voltage electrical distribution system set forth in claim 1 wherein said voltage-limiting element comprises a zener diode in thermal contact with said PTC current-limiting device, the zener diode having a reverse avalanche breakdown voltage selected to be above said second voltage potential and below said first voltage potential, the zener diode having a cathode electrode connected to said second distribution wire, and the zener diode having an anode electrode connected to the common return path.

3. The electrical overvoltage protection circuit in a dual voltage electrical distribution system set forth in claim 1 wherein said PTC current-limiting device comprises a polymeric positive temperature coefficient (PPTC) device.

4. The electrical overvoltage protection circuit in a dual voltage electrical distribution system set forth in claim 1 further comprising a first fuse in series between the first energy source and the first distribution wire, whereby when a said crossover occurs said voltage limiting element conducts a sufficiently large current to blow the first fuse and thereby disconnect the first distribution wire from the first energy source.

5. The electrical overvoltage protection circuit in a dual voltage electrical distribution system set forth in claim 1 further comprising a second fuse in series between said second energy source and said PTC current-limiting device.

6. The electrical overvoltage protection circuit in a dual voltage electrical distribution system set forth in claim 5 wherein said PTC current-limiting device and said voltage-limiting circuit element are configured as a circuit module.

7. The electrical overvoltage protection circuit in a dual voltage electrical distribution system set forth in claim 6 wherein the circuit module is hard wired in the electrical distribution system.

8. The electrical overvoltage protection circuit in a dual voltage electrical distribution system set forth in claim 6 wherein the circuit module includes plug-in connectors and is plugged into a socket of the electrical distribution system.

9. The electrical overvoltage protection circuit in a dual voltage electrical distribution system set forth in claim 1 wherein the electrical distribution system is in a motor vehicle and the common return path includes a conductive chassis of the motor vehicle.

10. A module for protecting a dual voltage electrical distribution system from damage resulting from a cross-connection, said distribution system having a common return path, a high voltage energy source supplying energy at a first voltage potential to a first load via a first distribution wire, and a low voltage energy source supplying energy at a second voltage potential lower than said first voltage potential to a second load via a second distribution wire in physical proximity with the first distribution wire, said module comprising an electrical overvoltage protection circuit comprising:

a positive temperature coefficient (PTC) current-limiting device in series between said second voltage source and said second distribution wire, and

a voltage-limiting circuit element in thermal contact with said PTC current-limiting device, connected across said second distribution wire and the common return path and having a voltage limit set to be below said first voltage potential and above said second voltage potential,

whereby when a crossover occurs during which said second distribution wire becomes cross-connected to said first distribution wire, said voltage-limiting circuit element conducts a large current and generates heat which is transferred to said PTC current-limiting device thereby aiding said PTC current-limiting device to switch from an untripped state to a tripped state and limiting current flow from the low voltage energy source through the first voltage distribution wire to a nonhazardous level.